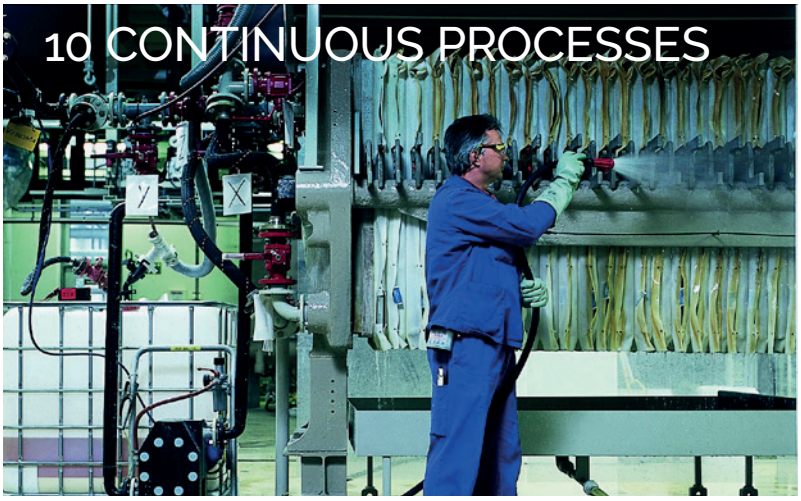
CABB

YOUR PARTNER IN FINE CHEMISTRY

WELCOME TO CABB

Fine Chemical & Custom Manufacturing Solutions



CONTENTS

THE CABB GROUP: SOPHISTICATED FINE CHEMICALS

The CABB Group is a globally active manufacturer of precursors, intermediates and active substances in the fine chemical industry. It specializes in the custom manufacturing of highly complex molecules for leading companies, especially those in the agrochemical and pharmaceutical industries. CABB is also a global market leader for high-purity monochloroacetic acid.

Headquartered in Sulzbach am Taunus, Germany, CABB employs around 1,100 people and generates an annual revenue of around half a billion euros.

CLOSE PARTNERSHIPS

Our Custom Manufacturing Business Unit collaborates closely with customers to develop and optimize individual steps in their value chain for the synthesis of pesticides, medications and other complex and usually patented chemical products. Its production sites are at Pratteln in Switzerland, Kokkola in Finland and Galena, Kansas, USA.

The Acetyls Business Unit provides companies, especially those in the personal care and food industries, with individually tailored supply chain solutions for high-purity monochloroacetic acid and its derivatives. Its production sites are at Gersthofen and Knapsack, Germany, and at Jining in China.

INVESTMENTS

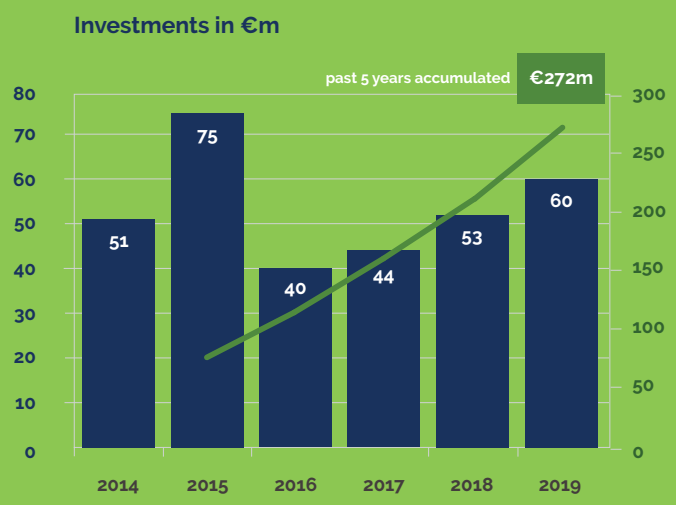
The CABB Group has a history of strategically investing in its assets, leadership and staff in order to continuously meet or exceed our customers' high expectations in terms of technology, quality and reliability. More than a quarter of a billion euros was invested during the five-year period from 2015 to 2019 alone.

HSEQ

As a global leader in the fine chemical industry, CABB pays the utmost attention to all aspects related to health, safety, environment and quality – from plants and processes to people management and training. Complementing our own efforts, we are regularly audited by authorities, certification agencies and major customers.

€ 523m
turnover

1,140
employees
(worldwide)



CUSTOM MANUFACTURING BY CABB

With around 800 employees and three world-class assets in Finland, Switzerland and the USA, our Custom Manufacturing Business Unit is a strategic partner to all major players in the agrochemical industry, as well as leading pharmaceutical companies and performance chemical manufacturers.

Leveraging unrivalled experience in chemical process design, we master complex multi-step syntheses in batch volumes just as reliably as continuous processes on a scale of thousands of tons per year.

Our core technologies, sophisticated infrastructure and the wide range of tools at our disposal enable us to individually develop the ideal solution for each customer's specific challenge. This includes the following models of cooperation:

CUSTOMER NEED	REQUIRED OUTCOME	CABB DELIVERABLES
Second sourcing	Risk mitigation, supply security	• Reliable provision of volumes with short lead times • Continuous cost improvement
Outsourcing	Make-or-buy decision	• Reliable provision of known volumes • Process optimization and continuous improvement
Innovation-to-market	Process design, asset developement, scale-up	• Partnership contract including IP confidentiality • Development of chemical process • Flexible scale-up of assets, provision of samples • Creation of entire value chain including support functions • Delivery to meet project timelines • Volume ramp-up

ACETYLS BY CABB

CABB's Acetyls Business Unit employs around 350 people and operates production facilities in Germany and China. It provides a wide portfolio of monochloracetic acid (MCA), its derivatives and by-products in different purity grades and in various forms.

Our global set-up, combined with our technological expertise and broad portfolio of offerings, enables us to develop individually optimized supply-chain solutions reflecting the customer's specific requirements. This ability, combined with a track record of continuous improvement, has helped us build intimate, long-lasting customer relationships around the world.

PRODUCT PORTFOLIO

Monochloroacetic acid (MCA)

- Business Unit's core product, intermediate for further chemical synthesis

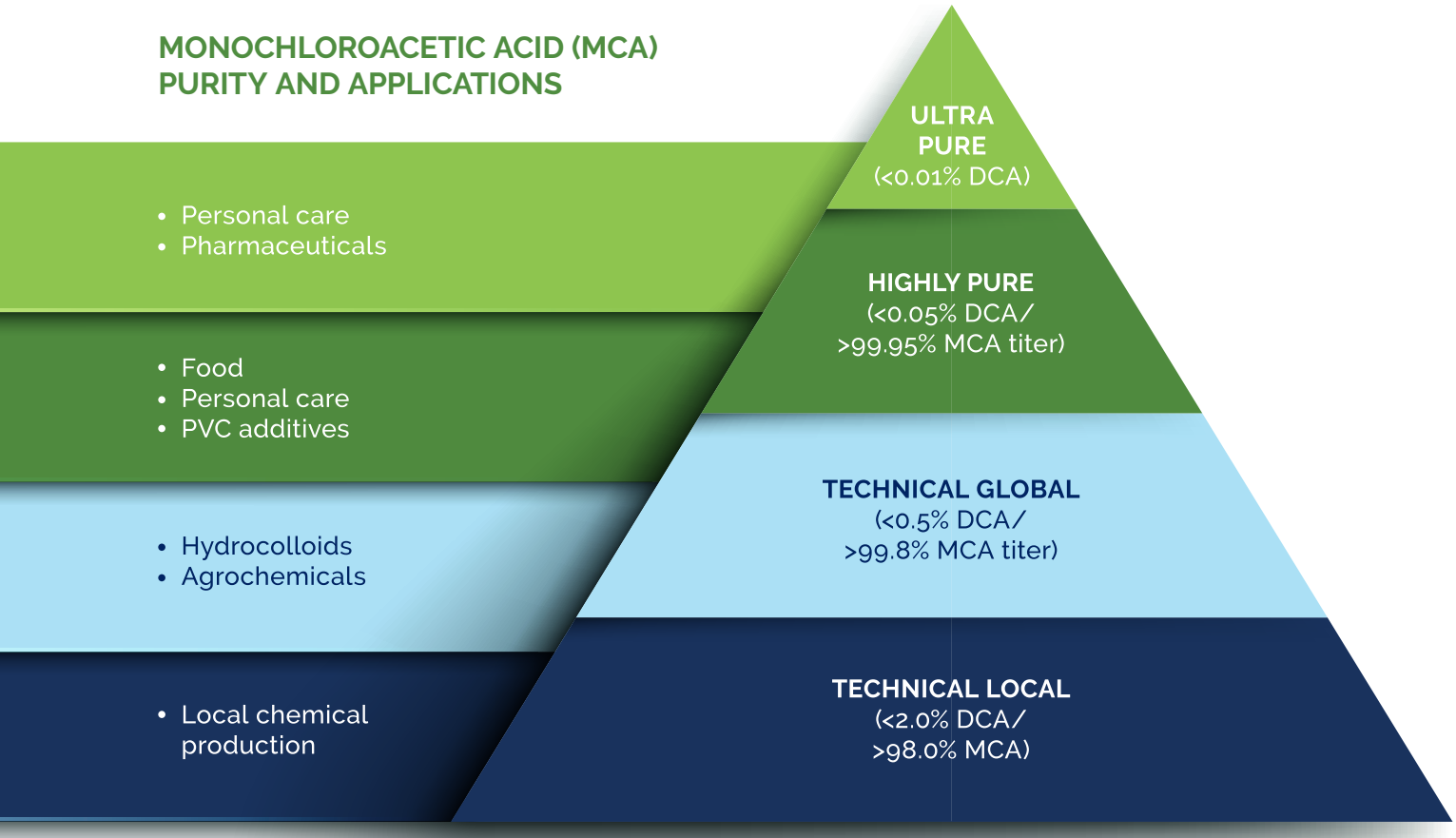
Acetyl derivates

- Downstream C_2 building blocks/intermediates derived from MCA for further chemical synthesis

Co-products

- Caustic soda and hydrochloric acid as by-products of the electrolysis/MCA process

MONOCHLOROACETIC ACID (MCA) PURITY AND APPLICATIONS



CABB'S CAPABILITIES AT A GLANCE

ACTIVITIES

- Custom manufacturing of intermediates and agro-chemical active ingredients
- Manufacture of reagents, building blocks and intermediates based on chlorination and sulfonation
- Production of monochloroacetic acid and its derivatives

PROJECT MANAGEMENT

- Customer-intimate approach
- Reliable long-term partnerships grounded in trust
- Strong protection of customers' intellectual property

QUALITY

- Manufacturing according to ISO 9001 and 14001
- Continuous improvement of quality and processes
- State-of-the-art quality control laboratory and equipment

TECHNOLOGY AND INFRASTRUCTURE

- Leader in chlorination, sulfonation and other technologies for fine chemical production
- Infrastructure for and expertise in alkylation, bromination, lithiation and oxidation on commercial scale
- Backward integration into key reagents and intermediates
- Pipeline supply of hazardous and corrosive reagents and intermediates to multipurpose assets
- Expertise in designing robust and safe processes for hazardous chemicals
- Process technology and expertise in turning batch processes into continuous processes
- Equipment and infrastructure for challenging multi-step syntheses
- Infrastructure for waste management (sewage plant, incineration plant)
- Process optimization throughout the whole lifecycle of a product

GLOBAL PRESENCE

OUR VERBUND AND RECYCLING SYSTEMS

Demonstration of the Verbund System

CABB operates integrated production and recycling systems at its sites in Knapsack and Gersthofen (Germany), Kokkola (Finland) and Pratteln (Switzerland).

At the Pratteln site, a vertically integrated Verbund and Recycling System enables highly efficient and sustainable chlorination and sulfonation reactions. Chlorine and sulfur trioxide are produced as primary raw materials, from which a variety of chlorination and sulfonation reagents are subsequently manufactured.

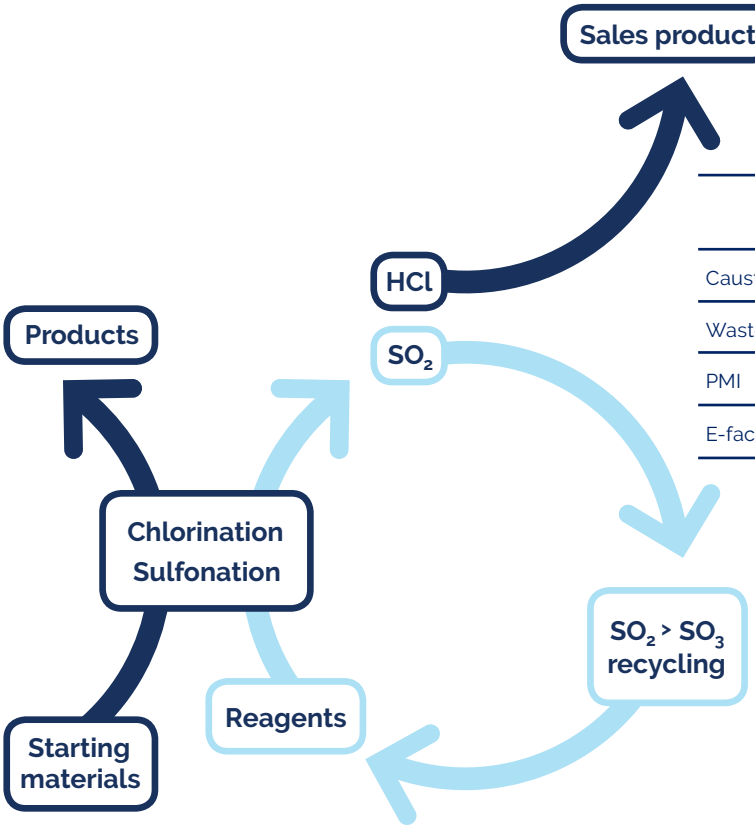
These are then used for the production of further downstream intermediates and non-GMP active ingredients. The HCl and SO_2 generated as off-gases are separated, purified and recycled or re-used.

Our Verbund and Recycling System is based on a sophisticated infrastructure for the handling of hazardous reagents and intermediates. where a hermetically sealed pipeline system links the reagent storage tanks with the multipurpose production plants.

SUSTAINABILITY

Chlorination and sulfonation reactions generate HCl and/or SO_2 as off-gases. In conventional plants, these gases are removed by reaction with caustic soda in a scrubber system, generating large amounts of saline waste water. But in CABB's recycling system, these off-gases are separated and purified. The HCl is then converted into hydrochloric acid for merchant markets. The SO_2 is fed back into the sulfur oxidizing process to generate sulfur-based reagents again. As a result, CABB is able to perform chlorination and sulfonation reactions without generating large amounts of waste.

This can be measured in terms of the Process Mass Intensity (PMI) and the Environmental factor (E-factor). For instance, off-gas scrubbing of a short-chain carboxylic acid by chlorination with thionyl chloride requires 3.7 kg of caustic soda per kg of product, generating 4.7 kg of saline waste water per kg of product. At CABB, this waste formation is completely prevented. (The typical E-factor value for fine chemicals is between 5 and 50.)



Our recycling process

	CONVENTIONAL SCRUBBER SYSTEM	VERBUND AND RECYCLING SYSTEM
Caustic soda	3.7 kg per kg product	0 kg
Waste water	4.7 kg per kg product	0 kg
PMI	6.3	2.1
E-factor	5.3	0.04

$$\text{PMI} = \frac{\text{total mass of incoming materials incl. solvents and water}}{\text{total amount of product}}$$

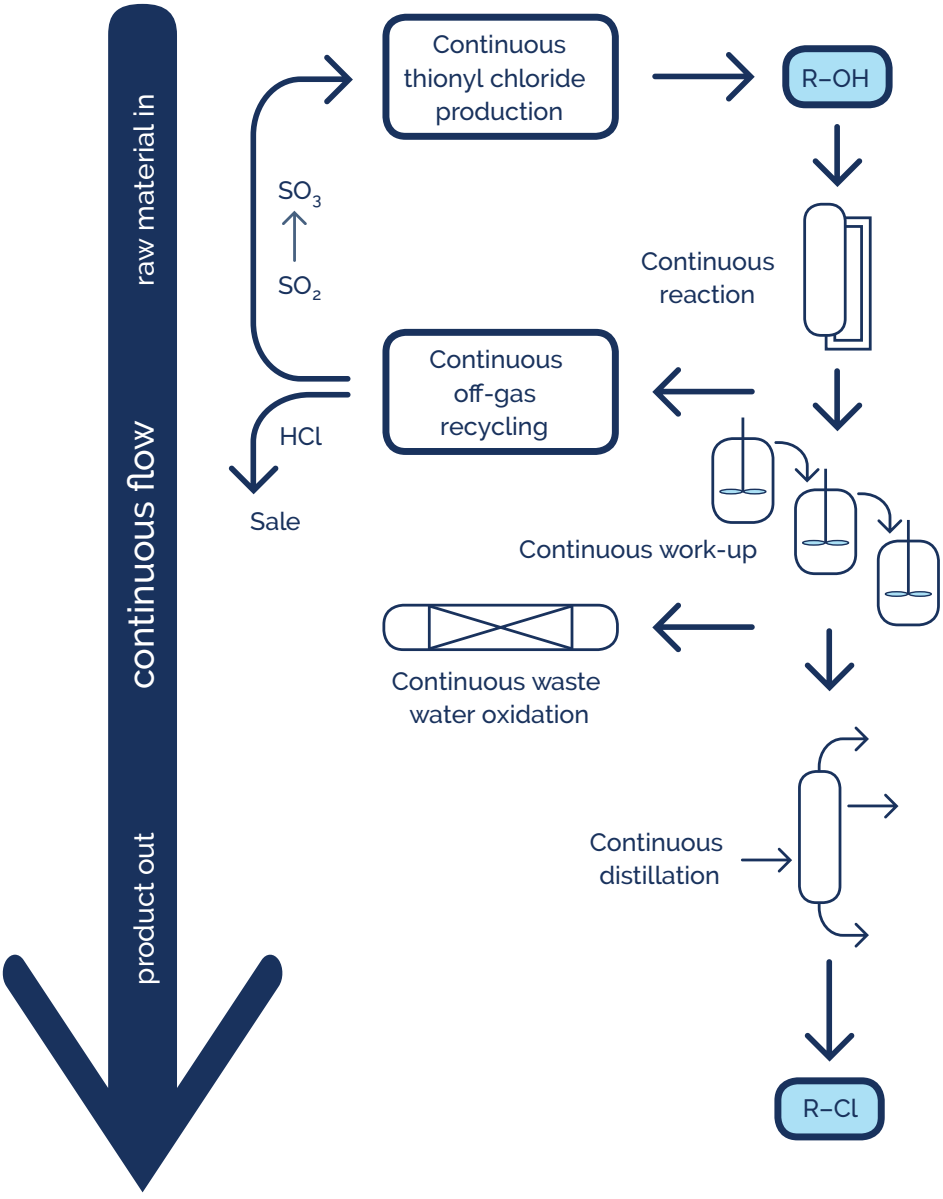
$$\text{E-factor} = \frac{\text{total mass of waste}}{\text{total amount of product}}$$

CONTINUOUS PROCESSES

Continuous processes are known to support sustainability because they require less material, less energy and fewer solvents compared to batch processes. In addition, reaction conditions are more constant, leading to higher product quality and safety.

Having operated dedicated plants with continuous processes for decades, CABB has in-depth expertise in this area. We also strive to optimize multi-purpose operations so that the processes chosen are the safest and most efficient, and these are often continuous processes.

CABB has a repertoire of continuous standard unit operations that can be combined into efficient systems without bottlenecks, backed up by an infrastructure of dedicated plants with continuous processes.




CABB
NS 29/32
NS 29/32
1000 ml
350

CORE CHEMISTRY

CHLORINATION

CABB has various chlorination reagents readily available: chlorine, thionyl chloride, sulfuryl chloride and hydrogen chloride gas. These reagents are produced in our Verbund System and are transported in hermetically sealed pipelines directly from storage tanks to multipurpose and dedicated reactors. The HCl and SO_2 formed as off-gases are fully recycled in our Verbund System in a sustainable and environmentally friendly way, preventing the formation of large volumes of scrubber waste water.

Benefits

- Backward integration into key reagents
- Sustainable production processes
- Efficient batch and continuous chlorination processes
- Environmentally friendly recycling of off-gases

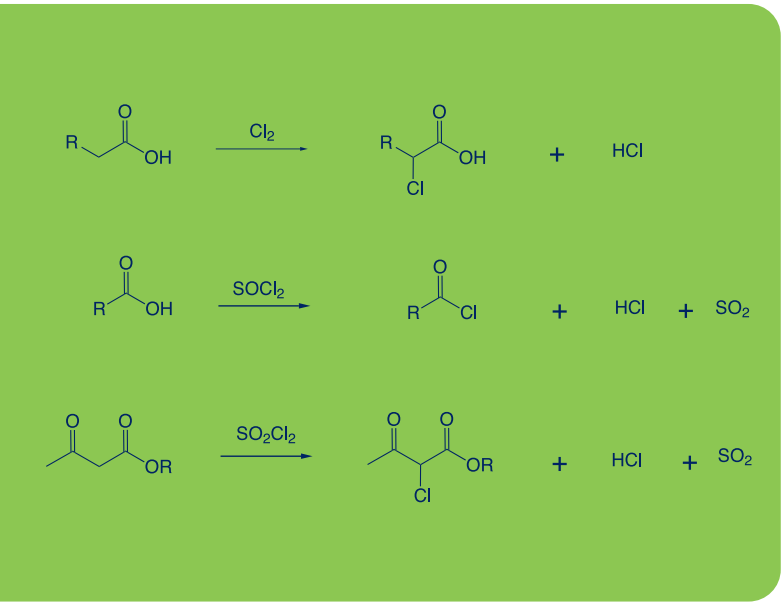
CHLOROMETHYLATION

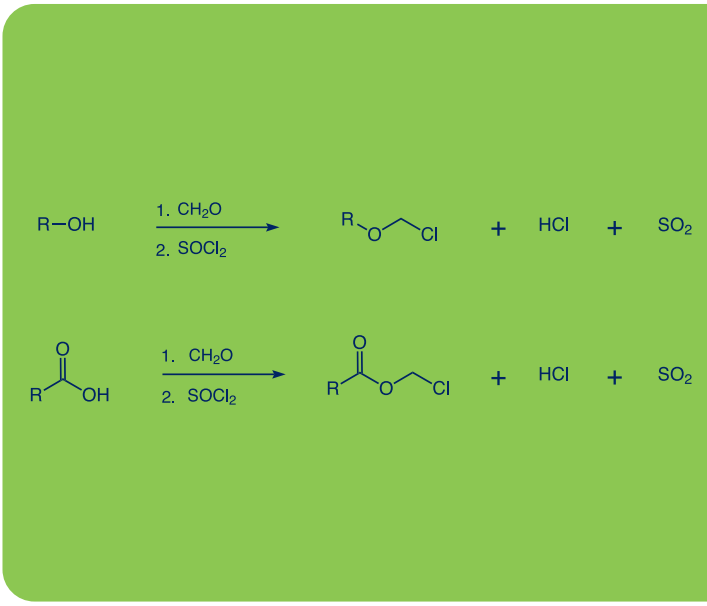
Chloromethylation of alcohols and carboxylic acids yields the corresponding chloromethyl ethers and esters. CABB's proprietary technology guarantees a smooth reaction with high yields and very low content of the carcinogenic byproduct bis(chloromethyl)ether.

Thanks to CABB's Verbund System, reagents are available from pipeline and off-gases are fully recycled.

Benefits

- Backward integration into key reagents
- Sustainable production processes
- Environmentally friendly recycling of off-gases
- Very low content of bis(chloromethyl)ether



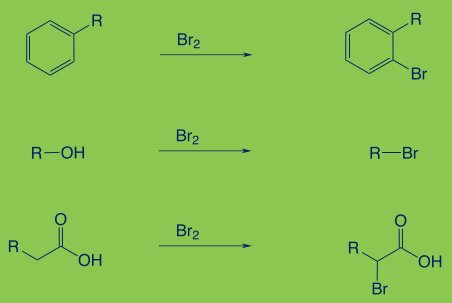


BROMINATION

CABB possesses the infrastructure and expertise to carry out bromination on a large industrial scale. We operate dedicated assets for bromination reactions, including storage facilities, pipelines and safety systems.

Benefits

- Long-standing experience in bromination reactions
- Dedicated infrastructure for large commercial-scale reactions

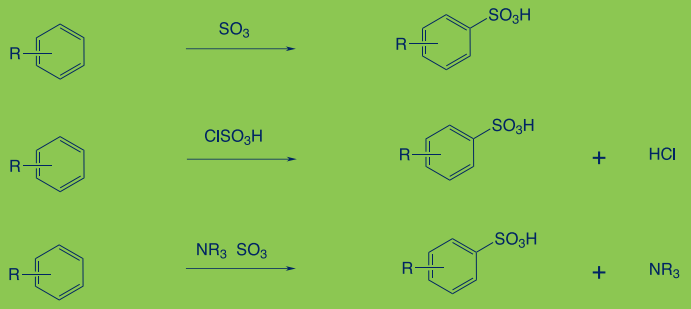


SULFONATION

As part of its Verbund System, CABB produces sulfonation reagents such as sulfur trioxide, oleum, chlorosulfonic acid and sulfur trioxide amine complexes for its own use and as sales products. This makes it possible to select the right reagent for the specific requirement. The availability of sulfur trioxide from pipeline for use as a reagent in multipurpose plants is unique and a benefit for fine chemical production.

Benefits

- Backward integration into key reagents
- Sustainable production processes including recycling of off-gases
- Large variety of sulfonation and sulfation reagents
- Use of sulfur trioxide for fine chemical production in multipurpose equipment
- Use of liquid sulfur dioxide as solvent
- Leading manufacturer of sulfur trioxide amine complexes

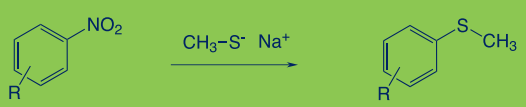


THIOALKYLATION

The reaction of (aromatic) nitro compounds with alkyl sodium thiolates yields (aromatic) thioethers is a straightforward synthesis. CABB is well-equipped for this type of reaction and for handling odorous raw materials and products thanks to its in-house incineration unit for vent gases and waste.

Benefits

- Vast experience in thioalkylation reactions
- Handling of odorous raw materials, products and waste



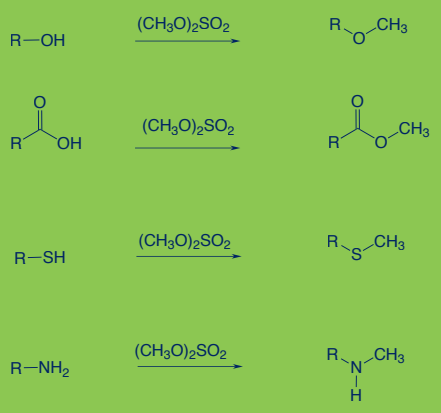
METHYLATION

Dimethyl sulfate is the reagent of choice for the methylation of O-, N- and S-functions like alcohols, thiols, carboxylic acids and amines to obtain the corresponding ethers, esters, thioethers and methylated amines.

With all the infrastructure for safe handling in place, CABB is the ideal partner for methylation reactions.

Benefits

- Infrastructure for safe handling and production
- Extensive expertise and experience in production, handling, processing and logistics

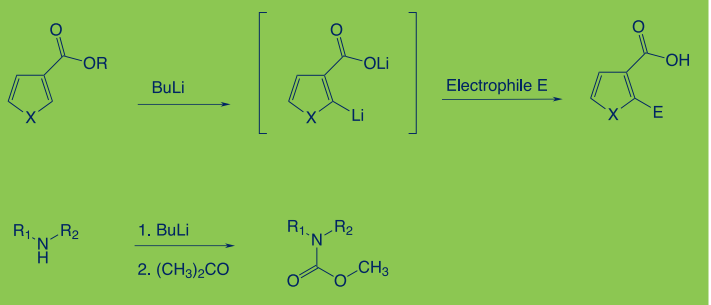


LITHIATION

Carrying out large-scale lithiation reactions requires specific and dedicated infrastructure. CABB has this expertise and infrastructure on a commercial scale. We operate a dedicated system for lithiation reactions which includes storage facilities for bulk organic lithium reagents, pipeline supply, safety measures and automated processes.

Benefits

- Expertise in lithiation reactions
- Dedicated infrastructure for large commercial scale
- Safe and robust processes for the use of hazardous reagents

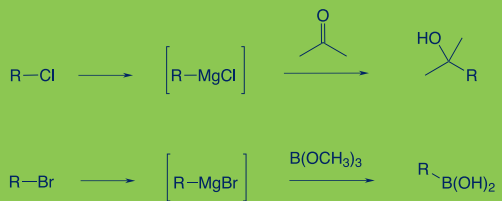


GRIGNARD REACTIONS

The Grignard reaction is an important method in organic synthesis for the preparation of carbon-carbon single bonds, mainly by combining nucleophilic alkyl- or arylmagnesium halides with electrophilic compounds such as aldehydes, ketones or esters to yield alcohols. It is also important for the preparation of boron derivatives which are subsequently used as reactants in Suzuki-type cross-coupling reactions.

Benefits

- Years of experience in commercial-scale Grignard reactions
- In-situ preparation of Grignard reagents
- Safe and robust production processes for the use of hazardous reagents and intermediates

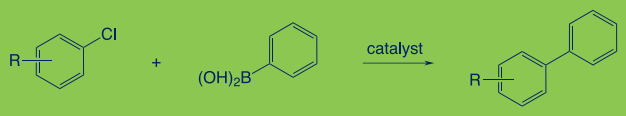


CROSS-COUPLING REACTIONS

In transition metal-catalysed cross-coupling reactions, carbon-carbon bonds are formed. The Suzuki coupling is the most prominent representative. The reaction of aromatic halides with arylboronic derivatives, for example, yields the corresponding biphenyl derivatives. CABB has many years of expertise in this chemistry including the recycling and reuse of precious catalysts.

Benefits

- Safe and robust production processes
- Recycling and reuse of catalysts

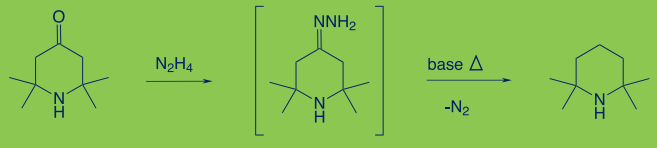


WOLFF-KISHNER REDUCTION

The Wolff-Kishner reduction is a method for reducing carbonyl compounds to the corresponding alkanes in a direct and selective way. CABB carries out this chemistry using dedicated, continuously operated equipment. Continuous processes of this kind are intrinsically safer, and a more regular and steady process results in higher yields and in products with higher purity.

Benefits

- Expertise in adapting batch processes into continuous ones
- Safe and robust production processes



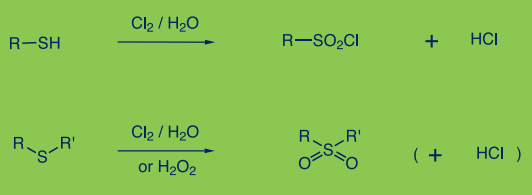
OXIDATION

Oxidizing thiols and thioethers with chlorine or hydrogen peroxide is an advantageous and direct method for obtaining sulfonyl chlorides and sulfones.

CABB also carries out a variety of other oxidation reactions using air and catalysts. Some of these are performed as continuous processes.

Benefits

- Backward integration into key reagents
- Environmentally friendly recycling of off-gases
- Hydrogen peroxide reactions conducted safely
- Expertise in continuous processes and their handling

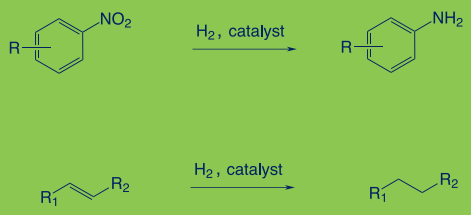


REDUCTION/HYDROGENATION

Hydrogenation reactions at ambient or elevated pressure, such as the reduction of aromatic nitro compounds or the saturation of double bonds, can be carried out as batch or continuous processes. CABB has the equipment and expertise for both. The safe handling of pyrophoric catalysts and their recycling and reuse are additional benefits.

Benefits

- Safe and robust production processes
- Safe handling of pyrophoric catalysts



CAPABILITIES

MULTI-STEP SYNTHESES

CABB is ideally equipped to perform demanding multi-step syntheses of intermediates and active ingredients, and its plants and infrastructure enable efficient and sustainable production.

We are able to carry out a vast range of standard chemical reactions based on our core chemistries in order to support efficient manufacturing on a large scale.

CORE CHEMISTRY

REACTIONS	REAGENTS
Chlorination	Cl_2, $SOCl_2$, SO_2Cl_2, HCl, ...
Bromination	Br_2, HBr, ...
Sulfonation	SO_3, HSO_3Cl, H_2SO_4, ...
Sulfochlorination	HSO_3Cl, ...
Alkylation	Methylation, Thioalkylation, Chloromethylation, ...
Oxidation	Cl_2, H_2O_2, HNO_3, ...
Reduction	Pd/H_2, Pt/H_2, $NaBH_4$, Wolff-Kishner, ...
Lithiation	n-BuLi, LDA, ...
Grignard reaction	RMgX
C-C Cross-coupling	Suzuki, ...

OTHER ROUTINE OPERATIONS & CRITICAL RAW MATERIALS

REACTIONS	REAGENTS
Friedel-Crafts acylation	$AlCl_3$, $FeCl_3$
Amidation	NH_3 (g), NH_3 (aq), NH_2R, ...
Cyanation	NaCN, ...
Esterification/ Saponification	
Formylation	
Silicon chemistry	
and many more ...	
Handling of critical raw materials	Acetaldehyde Epichlorohydrine Hydrazine hydrate Methyl chloride Solid sodium Sodium cyanide Chloroformates ...

EQUIPMENT FOR CUSTOM MANUFACTURING

CABB is fully equipped to carry out demanding chemical syntheses in our multipurpose plants. This enables us to start at low volumes in our pilot plant and optimize processes across the product's entire lifecycle up to full commercial production. Designing and implementing safe and robust production processes is our top priority.

CABB continuously improves its manufacturing processes to guarantee safe production conditions that are as efficient as possible. CABB cares about the environment and has incineration units and a sewage treatment plant on-site. Our Verbund and Recycling System ensures we operate sustainably.

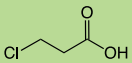
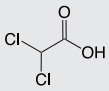
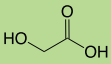
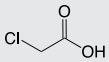
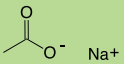
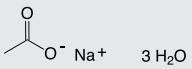
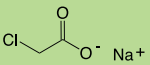
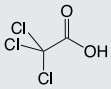
PRODUCTION EQUIPMENT

Total batch reactor capacity: approx. 1,320m³
Reactor sizes ranging from 0.3 to 19 m³
Standard operating temperatures: -25 to 160°C
Special temperatures: -40 to 250°C
Pressure: -1 to 40barg

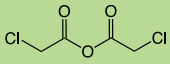
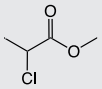
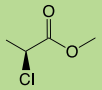
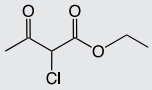
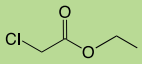
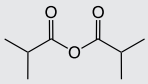
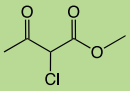
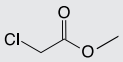
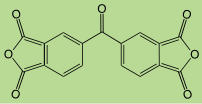
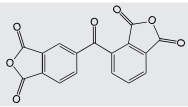
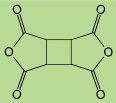
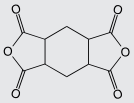
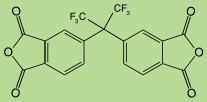
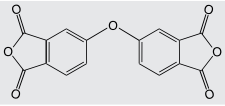
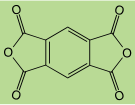
SPECIAL EQUIPMENT	ISOLATION OF SOLIDS	BATCH DISTILLATIONS BATCH EXTRACTIONS	WASTE HANDLING
Complete hastelloy train	Inverting and peeler centrifuges (horizontal, vertical)	Continuous distillations (fractionated, thin film, short path)	Aqueous waste disposal (on-site biological treatment)
Inconel reactor	Paddel, cone, double cone and filter driers	Continuous extractions (mixer/settler, column)	Aqueous waste disposal (off-site biological treatment)
BUSS Loop® reactor (stainless steel)	Pressure filters	Batch distillations	Aqueous waste disposal (on-site incineration)
Glass-lined loop reactors and CSTR cascades		Batch extractions	Aqueous waste disposal (off-site incineration)
Mixer-settler continuous extraction batteries			Aqueous waste pre-treatment (on-site Fenton oxidation, Photo-Fenton)
Continuous extraction columns			Hazardous organic waste (off-site incineration, on-site incineration)
Pilot plant (75L/187L reactors, filter, dryer, 20 tray fractionation column)			Off-gas scrubbers
			Off-gas incineration
			Off-gas recycling (SO_2, HCl)

PRODUCT OVERVIEW

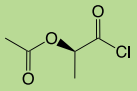
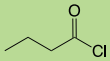
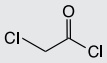
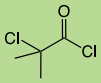
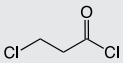
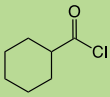
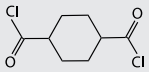
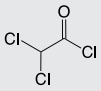
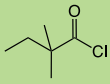
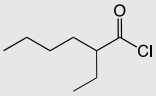
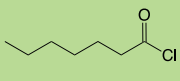
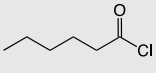
CARBOXYLIC ACIDS AND SALTS

CHEMICAL NAME	ABBREVIATION	CAS NUMBER	FORMULA
Acetic acid	ES	64-19-7	
2-Chloropropionic acid	CPS2	598-78-7	
3-Chloropropionic acid	3CPA	107-94-8	
Dichloroacetic acid	DCA	79-43-6	
Glycolic acid	GA	79-14-1	
Monochloroacetic acid	MCA	79-11-8	
Sodium acetate anhydrous	SAA	127-09-3	
Sodium acetate trihydrate	SAT	6131-90-4	
Sodium monochloroaceate	SMCA	3926-62-3	
Trichloroacetic acid	TCA	76-03-9	

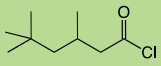
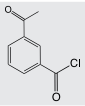
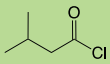
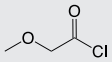
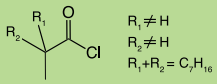
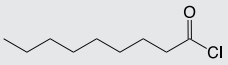
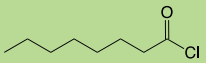
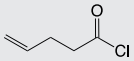
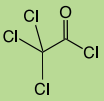
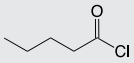
CARBOXYLIC ACID AMIDES, ANHYDRIDES AND ESTERS

CHEMICAL NAME	ABBREVIATION	CAS NUMBER	FORMULA
Chloroacetic anhydride	CAN	541-88-8	
2-Chloropropionic acid methyl ester	CPMRS	17639-93-9	
(S)-2-Chloropropionic acid methyl ester	CPMS	73246-45-4	
Ethyl-2-chloroacetoacetate	CAE	609-15-4	
Ethyl monochloroacetate	EMCA	105-39-5	
Isobutyric anhydride	IBUSAN	97-72-3	
Methyl-2-chloroacetoacetate	CAM	4755-81-1	
Methyl monochloroacetate	MMCA	96-34-4	
Benzophenone tetracarboxylic dianhydride	JAYHAWK BTDA	2421-28-5	
Asymmetric BTDA	JAYHAWK a-BTDA	104677-79-4	
Cyclobutane tetracarboxylic dianhydride	JAYHAWK CBDA	4415-87-6	
Cyclohexane tetracarboxylic dianhydride	JAYHAWK CHDA	2754-41-8	
Hexafluoroisopropylidene diphthalic anhydride	JAYHAWK 6FDA	1107-00-2	
Oxydiphthalic anhydride	JAYHAWK ODPA	1823-59-2	
Pyromellitic dianhydride	JAYHAWK PMDA	89-32-7	

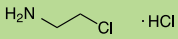
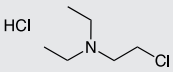
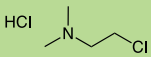
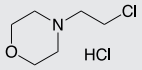
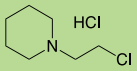
CARBOXYLIC ACID CHLORIDES

CHEMICAL NAME	ABBREVIATION	CAS NUMBER	FORMULA
(S)-(-)-2-Acetoxypropionyl chloride	APROC2	36394-75-9	
Acetyl chloride	AC	75-36-5	
n-Butyryl chloride	NBUC	141-75-3	
Chloroacetyl chloride	CAC	79-04-9	
2-Chloroisobutanoyl chloride	CIBUC2	13222-26-9	
3-Chloropropionyl chloride	CPROC3	625-36-5	
Cyclohexanecarbonyl chloride	CHCC	2719-27-9	
1,4-Cyclohexanedicarbonyl chloride	CHDCC	13170-66-6	
Cyclopropanecarbonyl chloride	CPCC	4023-34-1	
Dichloroacetyl chloride	DCAC	79-36-7	
2,2-Dimethylbutyryl chloride	DMBUC2	5856-77-9	
2-Ethylhexanoyl chloride	EHC2	760-67-8	
Heptanoyl chloride	HEPC	2528-61-2	
Hexanoyl chloride	CRC	142-61-0	
Isobutyryl chloride	IBUC	79-30-1	

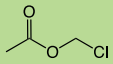
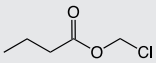
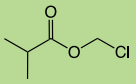
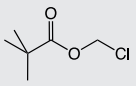
CARBOXYLIC ACID CHLORIDES

CHEMICAL NAME	ABBREVIATION	CAS NUMBER	FORMULA
Isononanoyl chloride	INOC	36727-29-4	
Isophthaloyl chloride	IPC	99-63-8	
Isovaleroyl chloride	IVAC	108-12-3	
Methoxyacetyl chloride	MAC	38870-89-2	
Neodecanoyl chloride	NDCL	40292-82-8	
Nonanoyl chloride	NOC	764-85-2	
Octanoyl chloride	OCC	111-64-8	
4-Pentenoyl chloride	PENC4	39716-58-0	
Pivaloyl chloride	PIC	3282-30-2	
Propionyl chloride	PROC	79-03-8	
Trichloroacetyl chloride	TCAC	76-02-8	
n-Valeroyl chloride	NVAC	638-29-9	

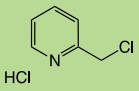
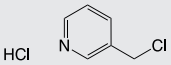
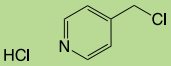
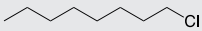
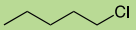
CHLOROALKYL AMINES

CHEMICAL NAME	ABBREVIATION	CAS NUMBER	FORMULA
2-Chloroethylamine hydrochloride	CEA100	870-24-6	
N-(2-Chloroethyl)-diethylamine hydrochloride	DEC	869-24-9	
N-(2-Chloroethyl)-dimethylamine hydrochloride	DMC	4584-46-7	
N-(2-Chloroethyl)-morpholine hydrochloride	MOC	3647-69-6	
N-(2-Chloroethyl)-piperidine hydrochloride	PIPEC	2008-75-5	

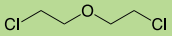
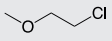
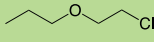
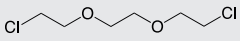
CHLOROMETHYL ESTERS

Chloromethyl acetate	CMA	625-56-9	
Chloromethyl butyrate	CMBA	33657-49-7	
Chloromethyl isobutyrate	CMIBA	61644-18-6	
Chloromethyl pivalate	CMPA	18997-19-8	

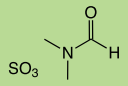
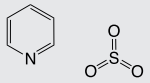
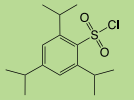
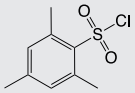
ALKYL AND ARYL CHLORIDES

CHEMICAL NAME	ABBREVIATION	CAS NUMBER	FORMULA
2-(Chloromethyl)-pyridine hydrochloride	CMPY2	6959-47-3	
3-(Chloromethyl)-pyridine hydrochloride	CMPY3	6959-48-4	
4-(Chloromethyl)-pyridine hydrochloride	CMPY4	1822-51-1	
1-Chlorooctane	OCCL	111-85-3	
n-Pentyl chloride	CPENT1	543-59-9	

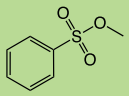
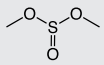
CHLOROALKYL ETHERS

Bis-(2-Chloroethyl) ether	BCEE	111-44-4	
2-Methoxyethyl chloride	MEC	627-42-9	
2-Propoxyethyl chloride	PEC	42149-74-6	
Triethyleneglycol dichloride	TEGDC	112-26-5	

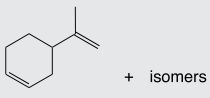
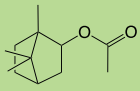
SULFUR TRIOXIDE AMINE COMPLEXES & SULFONYL CHLORIDES

CHEMICAL NAME	ABBREVIATION	CAS NUMBER	FORMULA
N,N-Dimethylformamide sulfur trioxide complex	DMFS	29584-42-7	
Pyridine sulfur trioxide complex	PSS	26412-87-3	
2,4,6-Triisopropylbenzenesulfonyl chloride	TPSCL	6553-96-4	
2,4,6-Trimethylbenzenesulfonyl chloride	TMBSC	773-64-8	

SULFONIC ACID DERIVATIVES, SULFITES, SULFONES

Benzenesulfonic acid methylester	BSSME	80-18-2	
Dimethyl sulfite	DMSI	616-42-2	
Ethylene sulfite	DMSIT	3741-38-6	
Trimethylene sulfite	TMSIT	4176-55-0	

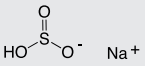
TERPENES

Camphene	CAMP	79-92-5	
Depanol	Depanol	n/a	
Isobornyl acetate	IBA	125-12-2	

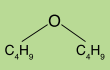
REAGENTS

CHEMICAL NAME	ABBREVIATION	CAS NUMBER	FORMULA
Sulfuryl chloride	SC	7791-25-5	
Thionyl chloride	TC	7719-09-7	
Chlorosulfonic acid	CHS	7790-94-5	
Sulfur dioxide	SO2	7446-09-5	

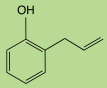
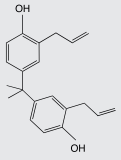
BASE CHEMICALS

Hydrochloric acid	SZ	7647-01-0	HCl
Sodium bisulfite	NB	7631-90-5	
Sodium hydroxide	NL	1310-73-2	NaOH
Sodium hypochlorite	BL	7681-52-9	NaOCl
Sulfuric acid	SE	7664-93-9	

HIGH PURITY SOLVENTS

N-Butyl ether	JAYHAWK NBE	142-96-1	

CROSSLINKERS

2-Allyl phenol	JAYHAWK 301	1745-81-9	
Diallyl Bisphenol A	JAYHAWK 302	1745-89-7	

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